CHAPTER 8
DEVELOPMENT OF MITIGATION ALTERNATIVES

Options for addressing flooding concerns include engineered projects, public information programs, regulations, planning measures, and environmental protection and enhancement measures. Comprehensive flood hazard management emphasizes selecting a mix of approaches to minimize flooding impacts. This chapter presents and defines the general types of alternatives commonly used in floodplain management.

General Categories of Solutions

Flood hazard management measures are commonly classified as structural or nonstructural. Structural measures involve physical activities in or near the stream such as excavation, placement of bank protection materials, and other engineering and construction activities. Nonstructural measures include stormwater and land use regulations, flood preparedness programs, public awareness programs, floodproofing, and maintenance programs. The federal government encourages the use of cost-effective, long-term nonstructural alternatives. Tables 8-1 and 8-2 summarize typical nonstructural and structural solutions, respectively.

Nonstructural Solutions

Table 8-1. Typical Nonstructural Flood Hazard Management Solutions

Measure	Description	Typical Activities
Public Information	Public information activities to advise people of the risks associated with flood hazards, about flood insurance, and ways to reduce flood damage	• Public outreach projects • Flood protection library • Flood preparedness programs • Elevation certification • Hazard disclosure • Public workshops or meetings
Regulation	Regulatory measures to provide protection for existing structures and new development through land use regulation	• High regulatory standards • Low-density zoning • Open space preservation • Regulatory consistency • Building codes • Stormwater management

Measure	Description	Typical Activities
Planning and Data Collection	Activities to develop accurate floodplain information and flood data and increase the understanding of the river's flood characteristics	• Floodplain and channel meander zone (CMZ) mapping • Flood data maintenance (GIS, databases) • Engineering studies • Modeling
Reduce Damage to Existing Structures	Measures addressing flood damage to existing structures (buildings, roads, bridges, levees, etc.)	• Acquiring or relocating floodprone structures • Floodproofing • Developing repetitive loss plans • Elevating buildings and roadways • Flood insurance
Emergency Response and Preparedness	Actions to minimize the effects of flooding on people, property, and the contents of buildings	• Individual action plans • Comprehensive planning • Flood warning systems • Stream and precipitation gauge monitoring • Flood facility maintenance programs • Emergency response plans • Critical facilities protection • Post-distaster mitigation
Natural Resource Protection Projects	Measures to preserve or restore natural areas or the natural functions of floodplain and watershed areas	• Wetland protection • Habitat protection • Erosion and sediment control • Forestry practices

Structural Solutions

Table 8-2. Typical Structural Flood Hazard Management Solutions

Measure	Description	Typical Activities
Floodplain Protection	Measures that reduce flood hazards for property, structures and occupants in the floodplain. Protection from inundation, floating debris, sediments, and the force of water flowing in the floodplain.	• Setback levees • Dikes • Elevating roads • Redesigning and replacing bridges • Constructing/expanding storage reservoirs

Measure	Description	Typical Activities
Bank Protection	Measures design to produce a stable, durable streambank that can withstand flood waters	• Reestablishing riparian vegetation • Constructing approach dikes • Installing gabions • Constructing windrow revetments • Reducing bank slope • Riprap
Conveyance Capacity	Increasing channel bed slope or cross-sectional area or decreasing channel roughness in order to increase the amount of flow that a stream can carry; increasing off-channel storage or floodplain storage	• Constructing overflow/secondary channels • Removing vegetation and debris • Widening or deepening the channel • Controlling growth of vegetation in the channel • Increasing floodplain storage by removing levees or moving roads
Natural Resource Protection Projects	Measures to preserve or restore natural areas or the natural functions of floodplain and watershed areas	• Wetland protection • Habitat protection • Erosion and sediment control • Forestry practices